subregions) was similar for coronal and sagittal scans. Only small changes were observed in the lateral femorotibial compartment (data not shown).

Conclusions: Surprisingly, the 1.5mm sagittal images displayed a similar rate and sensitivity to change in cartilage thickness over 2 years in the medial tibia, and a greater rate and sensitivity in weight-bearing medial femur than 1.0mm coronal images. Although partial volume effects are stronger in internal and external subregions in sagittal (and in anterior and posterior subregions in coronal) scans, the spatial pattern of cartilage loss was similar between both orientations.

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FAT-SUPPRESSED INTERMEDIATE WEIGHTED FAST SPIN ECHO AND DUAL ECHO STEADY STATE SEQUENCES FOR SEMIQUANTITATIVE ASSESSMENT OF FOCAL CARTILAGE DAMAGE AT 3 T MRI

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Purpose: Modern MRI systems offer a multitude of cartilage-dedicated sequences as possible options for quantitative assessment of cartilage morphometry in research and clinical settings. It is unknown, however, if there are differences among these dedicated sequences in their utility for semi-quantitative scoring of focal cartilage defects.

The aim of the study was to compare semiquantitative assessment of focal cartilage damage using the 3D dual echo in steady state (DESS) and intermediate-weighted (IW) 2D turbo spin echo (TSE) fat suppressed (FS) sequences at 3 Tesla (T) MRI.

Methods: The Joints on Glucosamine (JOG) study included 177 subjects aged 35-65 (95 men and 82 women) with frequent knee pain. 3 T MRI of both knees was performed at baseline on a Siemens Trio system using the same pulse sequence protocol as in the Osteoarthritis Initiative (OAI): sagittal IW 2D TSE FS, sagittal 3D DESS with water excitation (WE), axial multiplanar reformation (MPR) of sagittal 3D DESS WE, coronal MPR of sagittal 3D DESS WE, coronal IW 2D TSE. Cartilage status was scored on a scale from 0-6 according to the Whole Organ Magnetic Resonance Imaging Score (WORMS) by one experienced musculoskeletal radiologist (FWR) taking into account all five sequences. A total of 245 superficial (WORMS 2.0 lesions) or full-thickness defects (WORMS 2.5 lesions) were detected. In an additional consensus reading by two MSK radiologists (FWR, AG), the lesions were evaluated side-by-side using only the sagittal 3D DESS WE - and sagittal IW 2D TSE FS -sequences. Lesion conspicuity was graded from 0-3, hyper-and hypointensity signal changes adjacent to the defect were recorded as present or absent and the sequence that depicted the lesion with larger maximum diameter was recorded for each cartilage defect. Wilcoxon statistics were applied to determine differences between the sequences.

Results: 37 (17.5%) of the scorable lesions were located in the medial tibio-femoral (TF), 47 (22.8%) in the lateral TF and 126 (59.7%) in the patello-femoral compartment. 82.5% were superficial and 17.5%full-thickness defects. Conspicuity was superior for the IW-sequence ($p<0.001$), whereas the DESS-sequence revealed more associated signal changes ($p<0.001$). Comparing the DESS directly with the IW sequence, in 37 (17.5%) cases the DESS sequence showed the lesions as being larger; in 103 (48.8%) cases the IW showed the lesion as being larger; and in 71 cases (33.6%), both sequences depicted lesions as the same size ($p<0.001$).

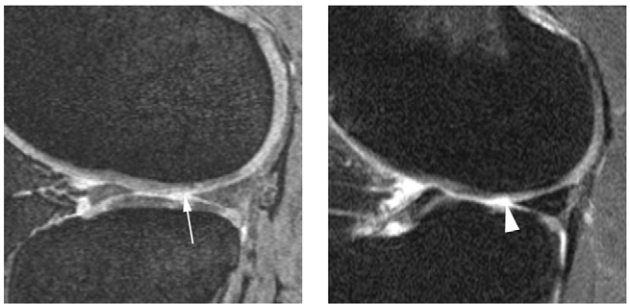

Figure 1. Superficial cartilage defect central lateral femur. Sagittal DESS image (left) only barely depicts defect (arrow). Superior delineation concerning size and conspicuity of focal cartilage defect (arrowhead) on sagittal IW fat suppressed image (right).

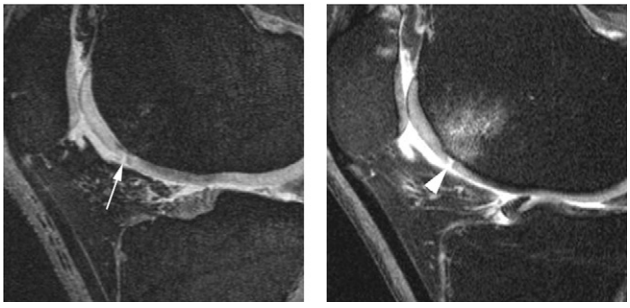

Figure 2. Full-thickness cartilage defect lateral femoral trochlea. Sagittal DESS image (left) visualizes defect (arrow) and shows hypointense intrachondral signal changes adjacent to defect (no arrow). Superior delineation concerning size and conspicuity of focal cartilage defect (arrowhead) on sagittal IW fat suppressed image (right). No adjacent signal changes are observed.

Conclusions: The cartilage-dedicated DESS-sequence was inferior to the IW sequence in depicting the number and size of focal cartilage defects. More adjacent intrachondral signal changes were observed with the DESS, but the significance of this finding is unclear.

To increase detection of focal cartilage defects semiquantitative assessment of should not only be performed on cartilage-dedicated sequences but also on conventional fat suppressed fast spin echo sequences. These findings might be especially relevant for future assessment of OAI image data as the sequence protocol and MRI system used in the JOG study was comparable to that used in the OAI.

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INTRA- AND PERIARTICULAR CYSTIC LESIONS IN KNEES WITH AND WITHOUT RADIOGRAPHIC OSTEOARTHRITIS AND LONGITUDINAL ASSESSMENT OVER SIX MONTHS USING 3 T MRI

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Purpose: Cystic lesions around the knee comprise a diverse group of entities, and are frequently encountered during routine magnetic resonance maging (MRI) of the knee. These lesions are commonly found in osteoarthritic knees. MRI is the technique of choice in characterizing lesions around the knee, and is very useful to confirm the cystic nature of the lesion, to evaluate the anatomical relationship to the joint and surrounding tissues, and to identify associated intra-articular disorders.

Abstract 411 – Table 1. Prevalence of intra- and periarticular cysts of the knee

Radiographic OA status (Kellgren-Lawrence grade)	Any	K/L 0 N=103	K/L 1 N=27	K/L 2 N=37	K/L 3 N=136	K/L 4 N=16
Any	222 (69.6%)	59 (57.3%)	21 (77.8%)	30 (81.1%)	97 (71.3%)	15 (93.8%)
Baker's cyst (popliteal)	128 (40.1%)	31 (30.1%)	16 (59.2%)	15 (40.5%)	56 (41.2%)	10 (62.5%)
Popliteal (septated only)	90 (28.1%)	22 (21.4%)	11 (40.7%)	9 (24.3%)	40 (29.4%)	8 (50%)
Medical meniscus	8 (2.5%)	3 (2.9%)	1 (3.7%)	0 (0%)	4 (2.9%)	0 (0%)
Lateral meniscus	no prevalent cysts					
ACL	9 (2.8%)	3 (2.9%)	0 (0%)	2 (5.4%)	4 (2.9%)	0 (0%)
PCL	11 (3.4%)	2 (1.9%)	0 (0%)	4 (10.8%)	4 (2.9%)	1 (6.3%)
Pes anserine	4 (1.3%)	0 (0%)	1 (3.7%)	1 (2.7%)	2 (1.5%)	0 (0%)
Semi membranosus	13 (4.1%)	1 (1.0%)	0 (0%)	1 (2.7%)	7 (5.2%)	4 (25.0%)
Prepatellar	6 (1.9%)	0 (0%)	0 (0%)	0 (0%)	5 (3.7%)	1 (6.3%)
Superficial infrapatellar	3 (0.9%)	1 (1.0%)	0 (0%)	0 (0%)	2 (1.5%)	0 (0%)
Deep infrapatellar	2 (0.6%)	0 (0%)	0 (0%)	0 (0%)	1 (0.7%)	1 (6.3%)
Hoffa's cyst	25 (7.8%)	6 (5.8%)	2 (7.4%)	7 (18.9%)	9 (6.6%)	1 (6.3%)
MCL bursitis	8 (2.5%)	1 (1.0%)	0 (0%)	0 (0%)	5 (3.7%)	2 (12.5%)
Iliotibial band	3 (0.9%)	0 (0%)	1 (3.7%)	0 (0%)	0 (0%)	2 (12.5%)
Tibiofibular joint	26 (8.2%)	10 (9.7%)	1 (3.7%)	5 (13.5%)	9 (6.6%)	1 (6.3%)
Gastrocnemius bursa	49 (15.4%)	8 (7.8%)	5 (18.5%)	10 (27.0%)	23 (16.9%)	3 (18.8%)
Other	47 (14.7%)	9 (8.7%)	2 (7.4%)	7 (18.9%)	24 (17.7%)	5 (31.3%)

Aim of the study was to describe prevalence of intra- and periarticular cystic lesions of the knee in individuals with frequent knee pain and to observe these lesions over a period of six months.

Methods: The Joints On Glucosamine (JOG) Study includes 177 participants aged 35-65 (95 men and 82 women) with chronic, frequent knee pain. 3 T MRI (Siemens Trio) of both knees was performed at baseline and at 6-months follow-up using the following pulse sequence protocol: sagittal intermediate (IW) weighted fat suppressed turbo spin echo, sagittal 3D dual-echo at steady state (DESS), coronal and axial reformations of sagittal DESS, coronal IW sequences. The following cystic lesions were assessed: Baker's cysts, medial and lateral meniscal cysts, anterior cruciate ligament- and posterior cruciate ligament-cysts, semimembranous ganglia, prepatellar-, superficial- and deep-infrapatellar bursitis, Hoffa's cysts, tibiofibular joint cysts, pes anserine-, medial collateral ligament-, iliotibial band- and gastrocnemius-bursae. Cysts were measured to the nearest millimeter in the maximum diameter. In addition, the incidence of new cysts or change in size (increase/decrease) over 6 months were noted. We analyzed prevalence of cysts in relation to radiographic Kellgren-Lawrence grade by the Cochran-Armitage Trend Test.

Results: 319 knees (158 right and 161 left knees in 156 participants) were assessed. 222 (69.6%) of all knees showed at least one cyst. The most common cystic lesions were Baker's cysts (128 knees, 40.1%) followed by gastrocnemius bursae (49 knees, 15.3%), tibio-fibular joint cysts (26 knees, 8.1%) and Hoffa's cysts (25 knees, 7.8%). The other types of cysts were seen less frequently. 74% of the Baker's cysts increased or decreased in size over the 6 month follow-up, while the other cysts did not show relevant variation in size. Prevalence of any cystic lesions increased with K/L grade (K/L 0: 57%, K/L 1: 78%, K/L 2: 81%, K/L 3: 72%, K/L 4: 94%, $p < 0.004$) with similar results by specific type of cyst ($p < 0.05$). 22% of participants had bilateral Baker's cysts and 7% had bilateral gastrocnemius bursae. No significant differences in age, gender and body mass index between those with and without cysts were observed.

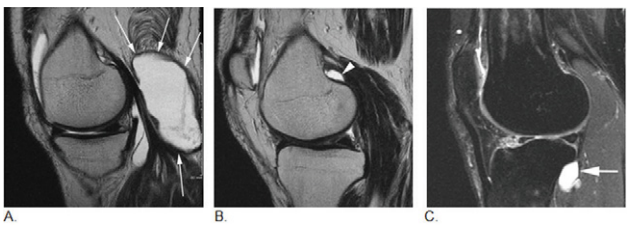

Figure 1. Common periarticular cysts of the knee. A. Large Baker's (popliteal) cyst (small arrow). B. Bursa at head of medial M. gastrocnemius (arrowhead). C. Tibiofibular joint cyst (large arrow).

Conclusions: Cystic lesions around the knee joint are common and are increasingly observed with higher grades of osteoarthritis. Baker's cysts are the most common cystic lesions followed by gastrocnemius bursae, tibiofibular joint cysts and Hoffa's cysts. Researchers should be aware that prevalence of cystic lesions increases with severity of radiographic OA status.

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COMPARISON OF WORMS AND BLOKS SEMI-QUANTITATIVE KNEE MRI SCORING FOR ASSESSING CARTILAGE LOSS: RESULTS FROM THE OSTEOARTHRITS INITIATIVE

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Purpose: Cartilage lesions in the knee can be graded using semi-quantitative (SQ) methods. Whole Organ MRI Scoring (WORMS) and Boston Leeds Osteoarthritis Knee Scoring (BLOKS) both assess areal extent and depth of cartilage lesion. WORMS uses a single 7 point scale in 14 anatomical subregions. BLOKS uses separate 0-3 scales for extent and depth, each scored in 8 subegions. Such differences between the two methods may affect their relative sensitivities for assessing cartilage loss. In this study, we evaluated inter-reader reliability and relative sensitivities of WORMS and BLOKS as methods for assessing the presence of longitudinal cartilage loss from MRI of the OA knee.

Methods: We studied 115 knees with frequent pain, radiographic OA and risk factors for cartilage loss, which included baseline JSN (OARSI grade $\geq$1), malalignment (varus vs. non-varus) assessed from a full-limb radiograph and BMI (per SD increase). Cartilage morphology was scored using WORMS and BLOKS from baseline and 24-month visit knee MRIs. Images were read paired, but blinded to time order, by one of 2 experienced radiologists (FWR,AG). Each read approximately equal numbers of knees. 25 knees received duplicate readings to examine inter-reader reliability. WORMS and BLOKS readings of a knee were separated by at least 2 weeks, and the scoring system used first was randomly ordered. For both scoring systems we defined whole grade worsening of cartilage as an increase cartilage score (increase $>$0) in any subregion of a knee (or within the subregions of a specific tibio-femoral compartment, for compartment based analyses). For WORMS, based on experience in previous longitudinal studies, readers recorded when a definite, but "within-grade" change in a subregion occurred as well as recording whole grade changes.